iConverter® GM4 Network Interface Devices

Carrier Ethernet 2.0 Certified Compliant NIDs

The *iConverter*® GM4 is a Network Interface Device (NID) that delivers advanced Carrier Ethernet 2.0 services and provides demarcation at the edges of a network. The GM4 enables rapid service deployments, Service Level Agreement (SLA) assurances, comprehensive fault management and service protection. These advanced capabilities reduce operating costs, provide faster return on investment (ROI) and improve customer satisfaction.

Advanced Traffic Management and Policing

The GM4 supports MEF-certified User-to-Network Interface (UNI) functions including Class of Service (CoS) management, granular rate-limiting, and 802.1ad Provider Bridge VLAN stacking (Q-in-Q) for service multiplexing of multiple E-Line, E-LAN and E-Tree services. The GM4 provides flexible per-flow service mapping, traffic policing and shaping. CIR/EIR "two rates, three colors" ingress port policing provides the granular bandwidth optimization required for CE 2.0 services such as Business Ethernet Services and Mobile Backhaul. The GM4 also provides advanced classification and filtering of subscriber traffic as an EVC or CoS flow based on Layer 1, 2, 3 or 4 identifiers.

Comprehensive Service OAM

The GM4 provides comprehensive support of the latest carrier-class Ethernet Service OAM standards, enabling service assurance and reducing operational costs. IEEE 802.1ag Connectivity Fault Management (CFM) pro-actively monitors service availability and provides tools for rapid fault isolation. ITU-T Y.1731 Performance Monitoring provides the ability to monitor SLA parameters including frame delay, frame delay variation and frame loss. Hardware-based Delay Measurement and Loopback Measurement with nanosecond resolution provides the highest level of service testing and SLA assurance for delay sensitive voice and financial services.

Service Provisioning

Zero-Touch Provisioning (ZTP) enables efficiencies in service activation that accelerate turn up and reduce the need for on-site technicians. ZTP allows service provisioning to be centralized, standardized and remotely managed to reduce OPEX and provide faster return on investment. For Cable MSOs, the GM4 supports the CableLabs® DEMARC Auto-Configuration (DAC) standard for automating the provisioning of Ethernet services over DPoE networks.

- 1000Mbps and 100Mbps Carrier Ethernet Fiber Access NID
- MEF Carrier Ethernet 2.0 Certified Compliant
- Smallest full-function NIDs available with the lowest power consumption
- Advanced traffic management with service mapping and traffic policing and shaping
- IEEE 802.1ag End-to-End Connectivity Fault Management
- ITU-T Y.1731 End-to-End Performance Monitoring
- DEMARC Auto-Configuration (DAC) for DPoE Networks
- Zero-Touch Provisioning for automated service activation
- ITU-T Y.1564 Ethernet Service Activation Testing
- IETF RFC 2544 Ethernet Service Activation Testing with built-in test-head
- IEEE 1588v2 Transparent Clock
- ITU-T G.8031 Ethernet Linear Protection Switching
- ITU-T G.8032v2 Ethernet Ring Protection supporting multiple ring topologies with sub-50ms failover
- Remote management through TELNET, SSH and SNMPv1/v2c/v3
- SNMP management via Omnitron's *NetOutlook*® Network Management software
- Fully integrated with Cyan CyPortal®
- Commercial (0 to 50ºC), wide (-40º to 60ºC) and extended (-40º to 75º C) temperature ranges

SFPs not included

Service Testing and Validation

The GM4 supports ITU-T Y.1564 and RFC 2544 service testing to easily verify the configuration and performance of Ethernet services prior to customer hand off. RFC 2544 provides per flow testing of Key Performance Indicators (KPI), such as throughput, latency, jitter and frame loss up to full wire speed. Y.1564 is a comprehensive Carrier Ethernet testing standard that tests all data flows and service attributes, including multi-flow Information Rate and Traffic Policing. Y.1564 tests all performance attributes simultaneously so testing is run quickly and efficiently, and can detect potential interaction between data flows.

Protection Switching

The GM4 supports ITU-T G.8031 Ethernet Linear Protection Switching and G.8032v2 Ethernet Ring Protection Switching with Connectivity Check Messages (CCM) at 3.3ms rate for sub-50ms protection switching. G.8032v2 includes multi-ring protection and sub-ring support with 5-Port GM4.

Form Factors

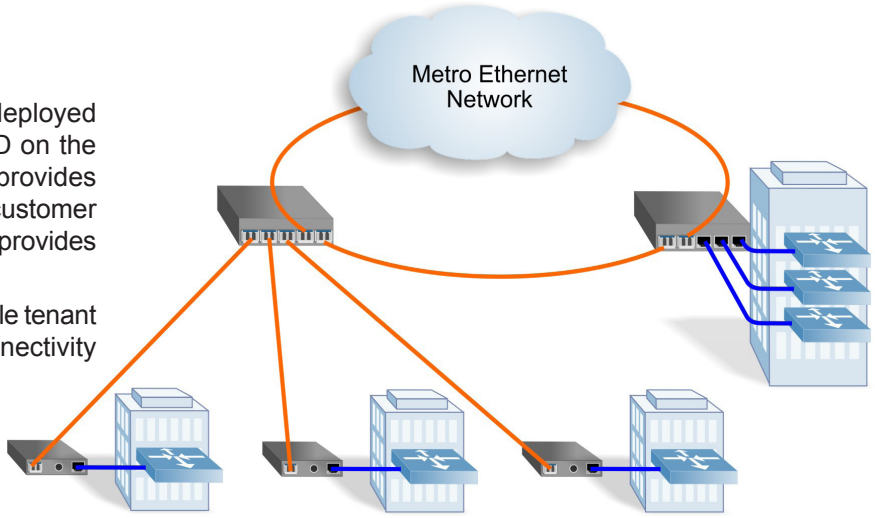
The GM4 is available as a compact standalone unit or as a chassis plug-in module. The hot-swappable plug-in module is available in 2 and 3-port models, and can be mounted in a 19 or 5-Module chassis with any combination of redundant AC and DC power supplies. It can also be installed in a 2-Module AC or DC powered chassis. The plug-in module can function as a management module and manage other modules in the same chassis, and operate as a Network Interface Device (NID). It features two Gigabit Ethernet backplane ports for connectivity to adjacent modules in a chassis for multi-port and multi-service configurations. The GM4 plug-in modules also function as a fiber transport module for the modular *iConverter* Ethernet and T1/E1 Multiplexer System.

The standalone GM4 is available in 2, 3, and 5 port models. They are DC powered with a terminal connector and available with an external AC/DC power adapter. The 5 port model is available with dual power inputs. The 5-port model supports any combination of 10/100/1000 RJ-45 copper ports and 100Mbps or 1000Mbps SFP fiber ports to provide service demarcation ports for multiple applications and customers.

APPLICATION EXAMPLES

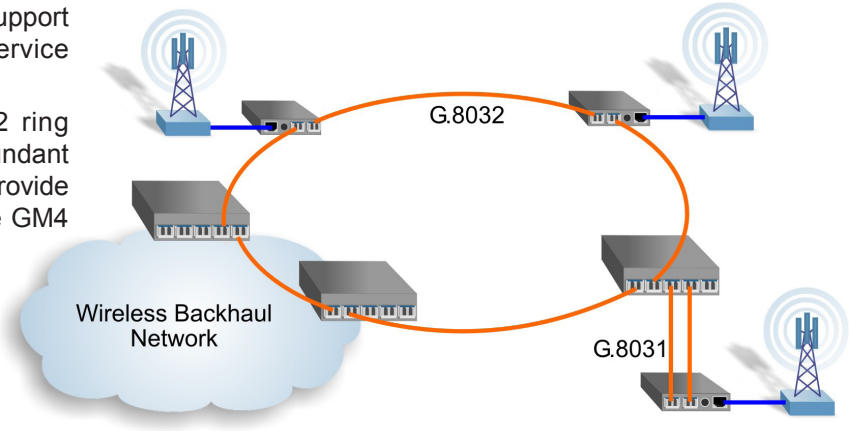
In this application example, 5-port GM4 NIDs are deployed as nodes on a Metro Ethernet ring. 5-port GM4 NID on the left is deployed as a hub aggregation device that provides connectivity to the ring and three fiber access links to customer locations. A 2-port GM4 terminates each fiber link and provides service demarcation at each customer premises.

The 5-port GM4 NID on the right is deployed at a Multiple tenant building with three RJ-45 UNIs providing copper connectivity to three different subscribers.



In this application example, GM4 NIDs are deployed as nodes on a wireless backhaul ring. The two 5-port GM4 NIDs connected to the Wireless Backhaul Network provide NNI functions for the ring. All GM4 NIDs on the ring support G.8032v2 Ethernet Ring Protection Switching for service protection with sub-50ms failover.

The 5-port GM4 NID on the right provides G.8032 ring connectivity and G.8031 linear protection with a redundant fiber access link to the tower. The 3-port GM4 NIDs provide LTE service demarcation at the cell towers, and all the GM4 NIDs on the network support Y.1588v2 clocking.



TRAFFIC MANAGEMENT

- IEEE 802.1Q VLAN tagging and 802.1ad Q-in-Q VLAN stacking
- Service Multiplexing of up to 256 EVCs
- User-configurable EtherType
- Ingress and Egress traffic management
- CIR/EIR Color Aware “two rates, three colors” bandwidth profiles for ingress rate limiting
- Advanced Flow and CoS classification per Port, VLAN ID, PCP, IPv4/IPv6 (TOS/DiffServe) Priority, MAC address, IP address, TCP Port or L2CP
- Layer 2 Protocol Tunneling (L2PT) to encapsulate STP, VTP, PVST and CDP protocols (subscriber CISCO protocols)
- All ports configurable as UNI or NNI
- IEEE 1588v2 Compliant transparent clock mode
- 10,240 byte Jumbo frames

PROTECTION AND REDUNDANCY

- ITU-T G.8031 Ethernet Linear Protection Switching
- ITU-T G.8032v2 Ethernet Ring Protection Switching with multi-ring protection and sub-ring support
- Sub-50ms failover for G.8031 and G.8032v2
- Link Failover 50ms protection switching
- Rapid Spanning Tree
- Link modes for port-to-port and UNI-to-UNI failure propagation

INTERFACES

- 10/100/1000BASE-T Copper and 100/1000BASE-X SFP fiber
- Small Form Pluggable (SFP) transceivers for standard or CWDM applications
- Port Mirroring

SERVICE OAM AND TESTING

- IEEE 802.1ag End-to-End Connectivity Fault Management (CFM) – with 8 Maintenance Domain levels and 256 Maintenance Associations
- Supports IEEE 802.1ag Maintenance Intermediate Points (MIPs) for fault isolation
- ITU-T Y.1731 End-to-End Performance Monitoring
- Hardware-based Delay and Loopback measurement with nanosecond resolution
- Advanced classification and filtering of Layer 1, 2, 3 or 4 subscriber traffic as an EVC or CoS flow
- ITU-T Y.1731 threshold monitoring and threshold crossing alerts
- IEEE 802.3ah Ethernet Link OAM with dying gasp
- Zero-Touch Provisioning
- DEMARC Auto-Configuration (DAC) for DPoE Networks
- ITU-T Y.1564 Ethernet Service Activation testing with multi-flow testing of information rate, latency, jitter and frame loss
- RFC 2544 built-in test-head with wire-speed, per flow testing of throughput, latency, jitter and loss
- ITU-T Y.1564 and RFC 2544 test heads support generation/reception of in-service and out-of-service L2, L3 and L4 frames
- Test-heads with configurable rate-limiting to isolate provisioning and network issues
- Per-port and per-flow Loopback with MAC swap
- Compatible with third party in-band loopback testing
- Built-in UTP cable tester for troubleshooting through to the Customer Equipment

NETWORK MANAGEMENT

- Remote management via TELNET, SSH, SNMPv1/v2c/v3
- SNMP management via Omnitron’s *NetOutlook* Network Management software
- IP-less management through 802.3ah OAM extensions
- Fully integrated with Cyan CyPortal for SLA monitoring
- MEF 30 and 31 Service OAM Fault Management MIBs

SPECIFICATIONS

Description	10/100/1000BASE-T to 100BASE-FX or 1000BASE-X Network Interface Device
Protocols	10BASE-T, 100BASE-TX, 1000BASE-T, 100BASE-FX, 1000BASE-X
Other Protocols	TCP/IP, ICMP, ARP, RSTP, SNTP, DAYTIME, ELPS
IP-Based Management	Telnet, SNMPv1, SNMPv2c, SNMPv3, SSH
Certified Compliances	UL, cUL, CE, FCC Class A, NEBS 3, MEF 9, MEF 14, MEF 21, MEF 30, MEF 31
Frame Size	Up to 10,240 bytes
UTP Cable	EIA/TIA 568 A/B, Category 5 and higher
Fiber Cable	Multimode: 50/125um, 62.5/125um, 100/140um Single-mode: 9/125um
Serial Cable	RS-232, 22 to 24 AWG, 12 to 50 pF/ft.
Copper Connector	RJ-45
Fiber Connectors	SFP: Any MSA Standard LC transceiver, RJ-45 (1000 or 10/100/1000Mbps) Dual Fiber: SC, ST Single Fiber: SC
Serial Connector	Mini DIN-6 female; Mini DIN-6 male to DB-9 female adapter included
Temperature	Standard Operating: 0 to 50º C Wide Operating: -40 to 60º C Extended Operating: -40 to 75º C Storage: -40 to 80º C
DC Power Input Connector	Plug-in Module: Power supplied by backplane 2 or 3-Port Standalone: 2.5mm Barrel Connector or 2-Pin Terminal Connector 5-Port Standalone: 2.5mm Barrel Connector or 3-Pin Terminal Connector

DC Power	2-Port Plug-in Module: 2.56A @ 3.3VDC (typical) 3-Port Plug-in Module: 2.85A @ 3.3VDC (typical) 2 or 3-Port Standalone: 8 - 60VDC 1.2A @ 9VDC (typical) 1.0A @ 12VDC (typical) 5-Port Standalone: 10-60 VDC 1.5A @ 12VDC (typical) 0.4A @ 48VDC (typical)
AC Power Adapter	2 or 3-Port Standalone: 100 - 240VAC/60Hz 0.1A @ 120VAC (typical) 5-Port Standalone: 100 - 240VAC/60Hz 0.2A @ 120VAC (typical)
Dimensions	Plug-in Module: W: 0.85" x D: 4.5" x H: 2.8" 2 or 3-Port Standalone - without brackets: W: 3.1" x D: 4.8" x H: 1.0" with brackets: W: 3.8" x D: 4.8" x H: 1.0" 5-Port Standalone - with brackets: W: 4.8" x D: 6.0" x H:1.325"
Weight	Plug-in Module: 8oz. 2 or 3-Port Standalone - without Power Adapter: 1.0 lb. with Power Adapter: 1.5 lb. 5-Port Standalone - without Power Adapter: 1.5 lb. with Power Adapter: 2.0 lb.
Humidity	5% to 95% (non-condensing)
Altitude	-100m to 4,000m
MTBF (hrs)	Plug-in Module: 340,000 2 or 3-Port Standalone - without Power Adapter: 100,000 with US Power Adapter: 100,000 with UNI Power Adapter: 100,000 5-Port Standalone - without Power Adapter: TBD with US Power Adapter: TBD with UNI Power Adapter: TBD

2 AND 3-PORT ORDERING INFORMATION

89xxR - x - xx

<Blank>	Standard Operating Temperature Range Model
W	Wide Operating Temperature Range Model
Z	Extended Operating Temperature Range Model

<Blank>	Plug-in Module
A	Standalone and External US AC Power Supply
B	Standalone and External Universal AC Power Supply
C	Standalone and DC Terminal Power
D	Standalone with integrated mounting brackets and External US AC Power Supply
E	Standalone with integrated mounting brackets and External Universal AC Power Supply
F	Standalone with integrated mounting brackets and DC Terminal Power

Port Configuration			Fiber Type	Distance	Connector Types				Tx Lambda (nm)	Rx Lambda (nm)	Min. Tx Power (dBm)	Max. Tx Power (dBm)	Min. Rx Sensitivity (dBm)	Max. Rx Power (dBm)	Min Att.	Link Budget (dB)
P1	P2	P3			ST	SC	SFP	RJ45								
FF	UTP	-	MM/DF	220/550m	8920R-0	8922R-0	-	-	850	850	-10	-4	-17	-3	-	7
FF	UTP	-	SM/DF	12km	8921R-1	8923R-1	-	-	1310	1310	-9.5	-3	-19.5	-3	-	10
FF	UTP	-	SM/DF	34km	-	8923R-2	-	-	1310	1310	-5	0	-23	-3	3	18
FF	UTP	-	SM/DF	80km	-	8923R-3	-	-	1550	1550	-5	0	-23	-3	3	18
FF	UTP	-	SM/DF	110km	-	8923R-4	-	-	1550	1550	0	5	-24	-3	8	24
FF	UTP	-	SM/DF	140km	-	8923R-5	-	-	1550	1550	2	5	-28	-8	13	30
FF	UTP	-	SM/SF	20km*	-	8930R-1	-	-	1310	1550	-9.5	-3	-20	-3	-	10.5
FF	UTP	-	SM/SF	20km*	-	8931R-1	-	-	1550	1310	-9.5	-3	-20	-3	-	10.5
FF	UTP	-	SM/SF	40km*	-	8930R-2	-	-	1310	1550	-3	0	-20	-3	3	17
FF	UTP	-	SM/SF	40km*	-	8931R-2	-	-	1550	1310	-3	0	-20	-3	3	17
SFP	UTP	-	-	-	-	-	8939R-0	-	Visit www.omnitron-systems.com/optical-transceivers.php for more information							
SFP	UTP	UTP	-	-	-	-	8970R-0	-	Visit www.omnitron-systems.com/optical-transceivers.php for more information							
UTP	UTP	UTP	-	100m	-	-	-	8974R-0								
SFP	SFP	UTP	-	-	-	-	8975R-0	-	Visit www.omnitron-systems.com/optical-transceivers.php for more information							
UTP	UTP	-	-	100m	-	-	-	8989R-0								
SFP	SFP	-	-	-	-	-	8999R-0	-	Visit www.omnitron-systems.com/optical-transceivers.php for more information							

Please consult Omnitron for other configurations.

5-PORT ORDERING INFORMATION

899xR - xx - xx

<Blank>	Standard Operating Temperature Range Model
W	Wide Operating Temperature Range Model

D	Standalone with integrated mounting brackets and External US AC Power Supply
E	Standalone with integrated mounting brackets and External Universal AC Power Supply
F	Standalone with integrated mounting brackets and DC Terminal Power

14	1 SFP Port and 4 RF-45 Ports
23	2 SFP Ports and 3 RJ-45 Ports
41	4 SFP Ports and 1 RJ-45 Port
50	5 SFP Ports

1	Single Power Supply Input
2	Dual Power Supply Inputs

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